

- WHAT HAVE WE LEARNED SO FAR?

- WHAT DATA ARE WE CONTINUING TO COLLECT

- OPTIONS TO CONSIDER



REST LAKE DAM

ANNUAL OPERATION

DATES

STAFF GAUGE READING

November 1 to Spring Ice Break-up

Minimum of 5'.0"

Spring Break-up to April 15

Minimum of 7'.3"

April 15 to July 1

7'.3" – 8'.6"

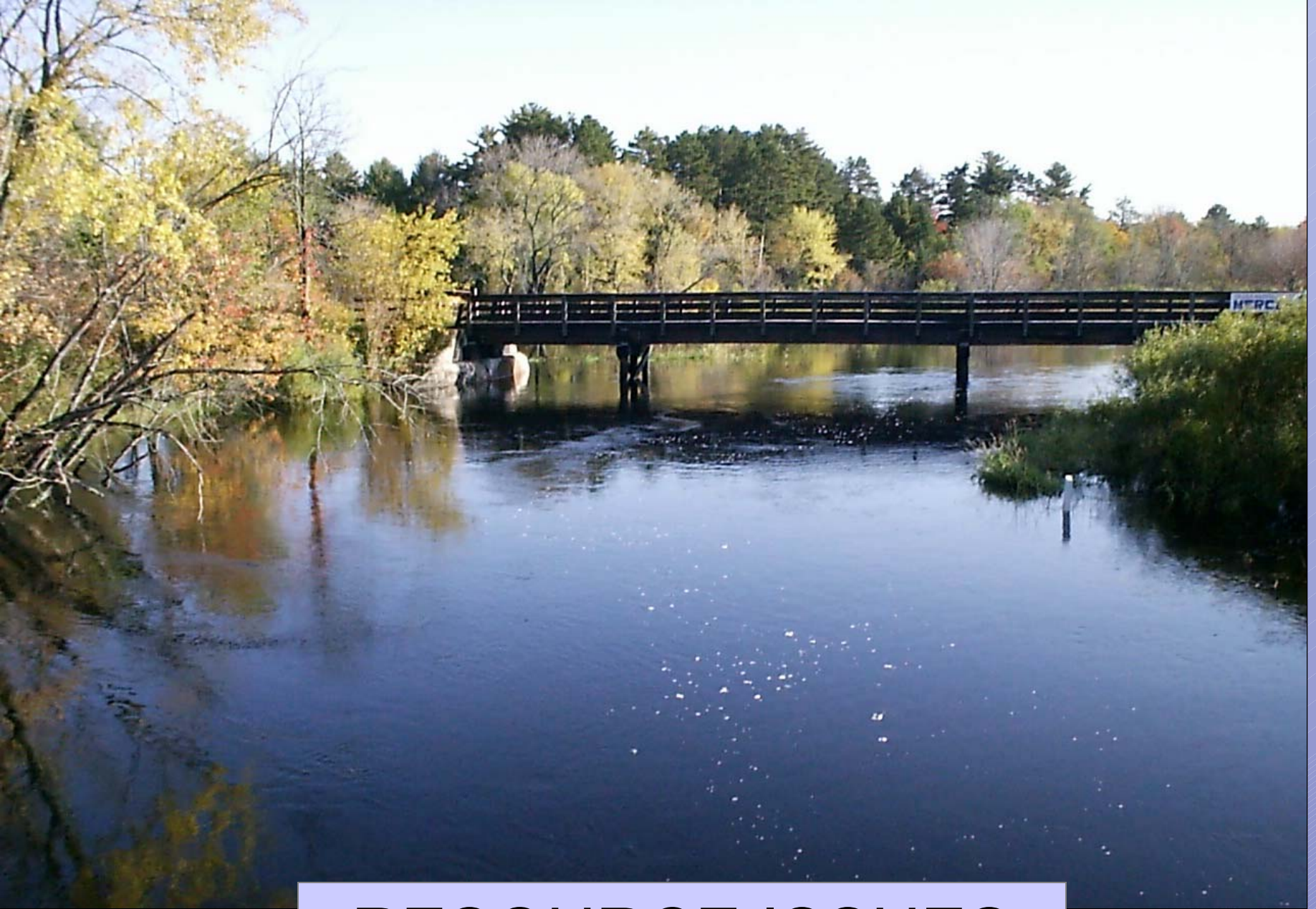
July 1 to September 1

No lower than 7'.3"

September 1 to November 1

No lower than 5'.0"

- At no time shall the chain be lowered at a rate exceeding 2 inches per day
- At no time shall the chain be lowered after ice forms.
- Required to pass 50 cfs base flow minimum



RESOURCE ISSUES

STURGEON REPRODUCTION



LOW NUMBERS OF LARGE OLD FISH



- AT THE PRESENT TIME WE HAVE 107 STURGEON MARKED IN THE TURTLE FLAMBEAU FLOWAGE AND MANITOWISH RIVER (10 % ARE STOCKED FISH)
- APPEAR TO HAVE TWO RESIDENT POPULATIONS, FISH THAT RESIDE IN BENSON LAKE AND TURTLE FLAMBEAU FLOWAGE
- FISH MOVE FROM THE TURTLE FLAMBEAU IN FALL AND STAGE IN BENSON LAKE PRIOR TO MOVING ONTO THE SPAWNING GROUNDS
- WITHOUT ADEQUATE FLOWS THESE POPULATIONS WILL BE ISOLATED (PHYSICALLY AND GENETICALLY)

NO EVIDENCE OF NATURAL RECRUITMENT OCCURRING





ALTHOUGH TIMING IS DIFFICULT, WE HAVE BEEN
SUCCESSFUL ON OBTAINING EGGS AND MILT...



- ...AND REARING STURGEON AT THE WILD ROSE FISH HATCHERY TO RESTOCK IN 1994 AND 98, BUT THERE IS NO EVIDENCE OF NATURAL REPRODUCTION IN THE POPULATION.

REASONS FOR LACK OF REPRODUCTION...

Lake Sturgeon (Acipenser fulvescens)



Konrad P. Schmidt

LOW DOWNSTREAM RIVER FLOWS IN SPRING



Rest Lake Flows 1997



- REVIEWED SPRING FLOW DATA
(APRIL -MAY) OVER THE LAST 30
YEARS

- 21 OUT OF THE LAST 30 YEARS HAD LOW
FLOW (~ 50-60 CFS) DURING MOST OF THE
MONTH OF MAY

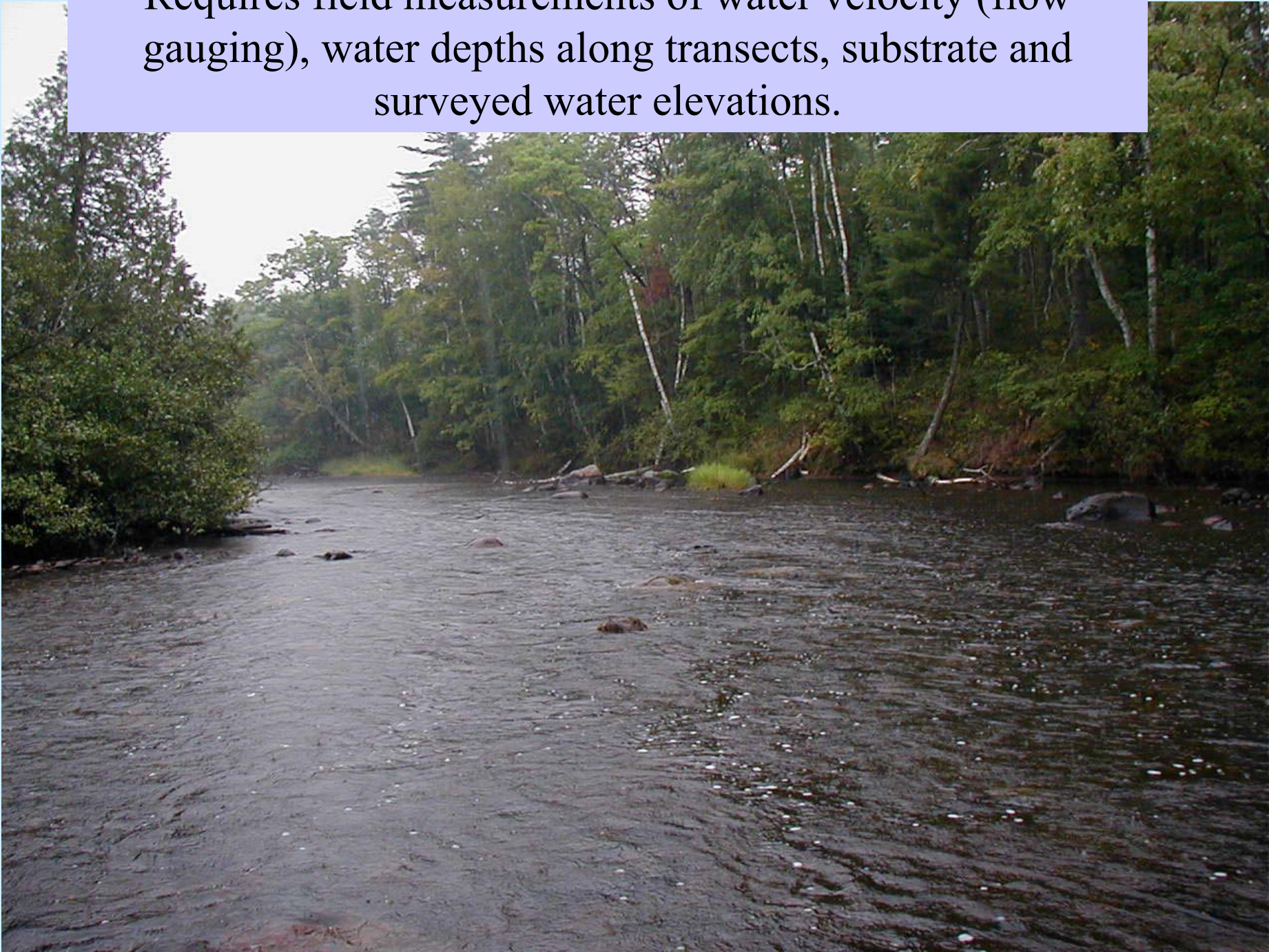
- 17 OUT OF THE LAST 20 YEARS HAD LOW FLOW
(~50-60 CFS) DURING THE MONTH OF MAY

- THE MONTH OF MAY IS CRITICAL FOR STURGEON
SPAWNING AND RECRUITMENT (BASED ON RIVER
WATER TEMPERATURE)



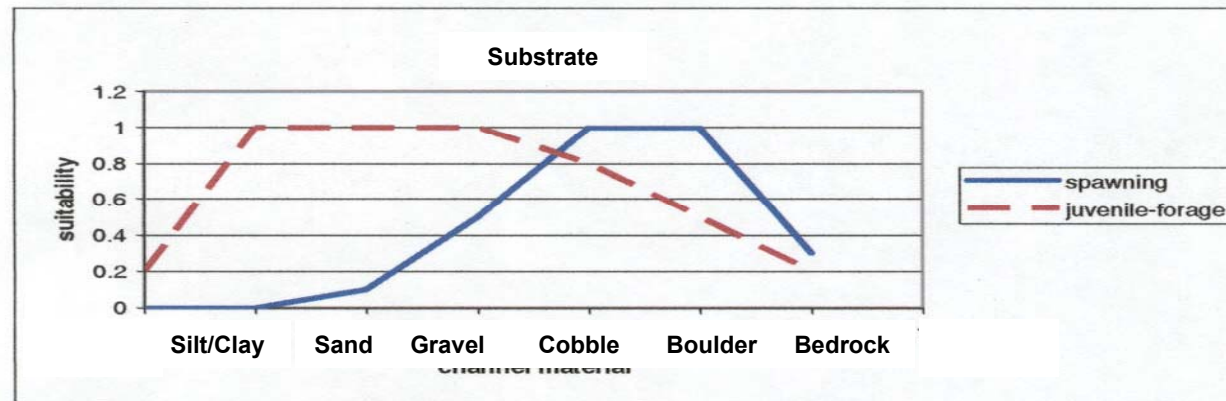
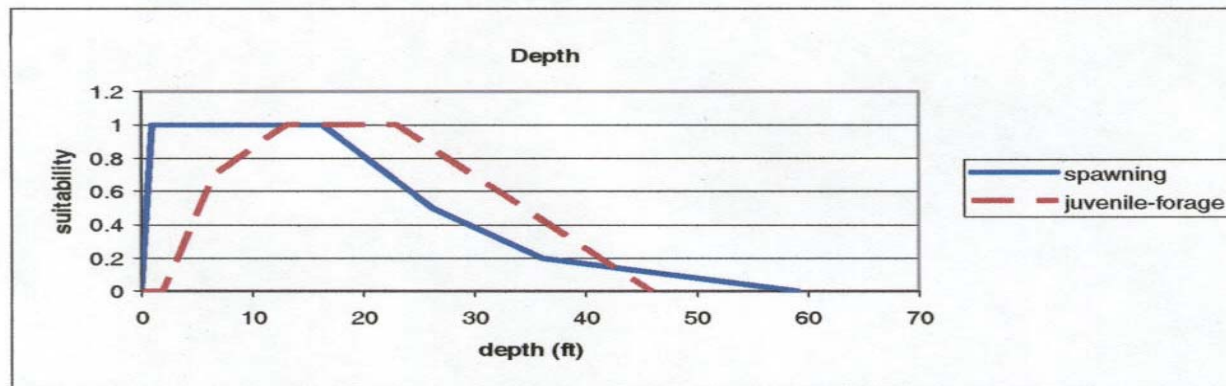
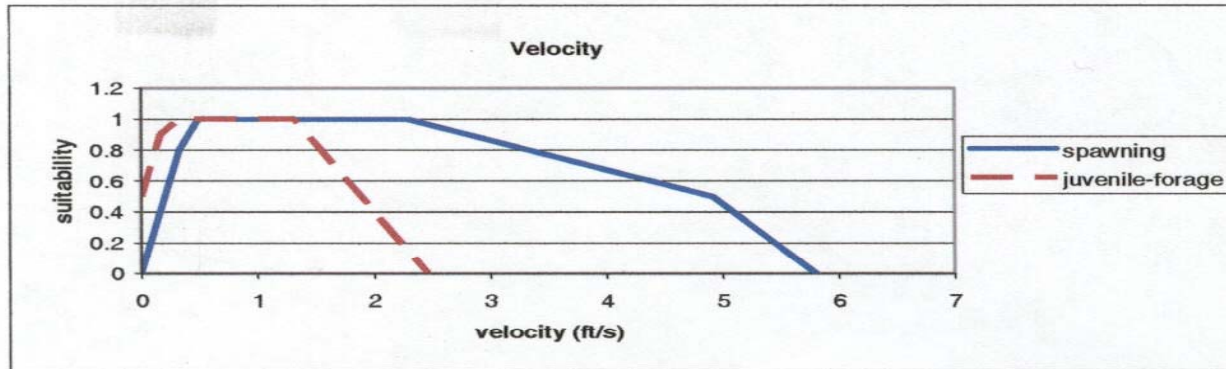
PHYSICAL HABITAT SIMULATION SYSTEM (PHABSIM)

Requires field measurements of water velocity (flow gauging), water depths along transects, substrate and surveyed water elevations.



Lake Sturgeon Suitability Curves

Source: Threader, R. W., R. J. Pope and P. R. H. Schaap, 1998. Development of a habitat suitability index model for lake sturgeon (*acipenser fulvenscens*). Report No: H-07015.01—0012, Technical Services and Projects, Ontario Hydro, Ontario, Canada.



PURPOSE OF PHABSIM

- Predicts physical habitat changes associated with flow alterations.
 - Provides information on the amount of suitable habitat (depth, substrate, water velocity) available for sturgeon at different flows.
 - It will allow us to determine a range of target flows suitable for sturgeon spawning and recruitment.
- It will also allow us to determine if these target flows are realistic (can the system provide it).
 - If the target flows are realistic, it will help us formulate implementable options.

FOR EXAMPLE...

If 180 cfs was the target flow for the month of May, what are our options to meet his?

1. Extend the fill period beyond Memorial Day.
2. Reduce the winter draw down to provide additional storage.
3. Begin filling the chain sooner before ice out to capture run-off that is normally passed.

IMPACTS AS A RESULT OF THESE OPTIONS

1. Extend the fill period.

- If inflow into the chain is 271 cfs and outflow is 180 cfs, this would require 81 days to fill the chain (42”).
- If inflow were 421 cfs and outflow is 180 cfs, this would require 30 days to fill the chain.

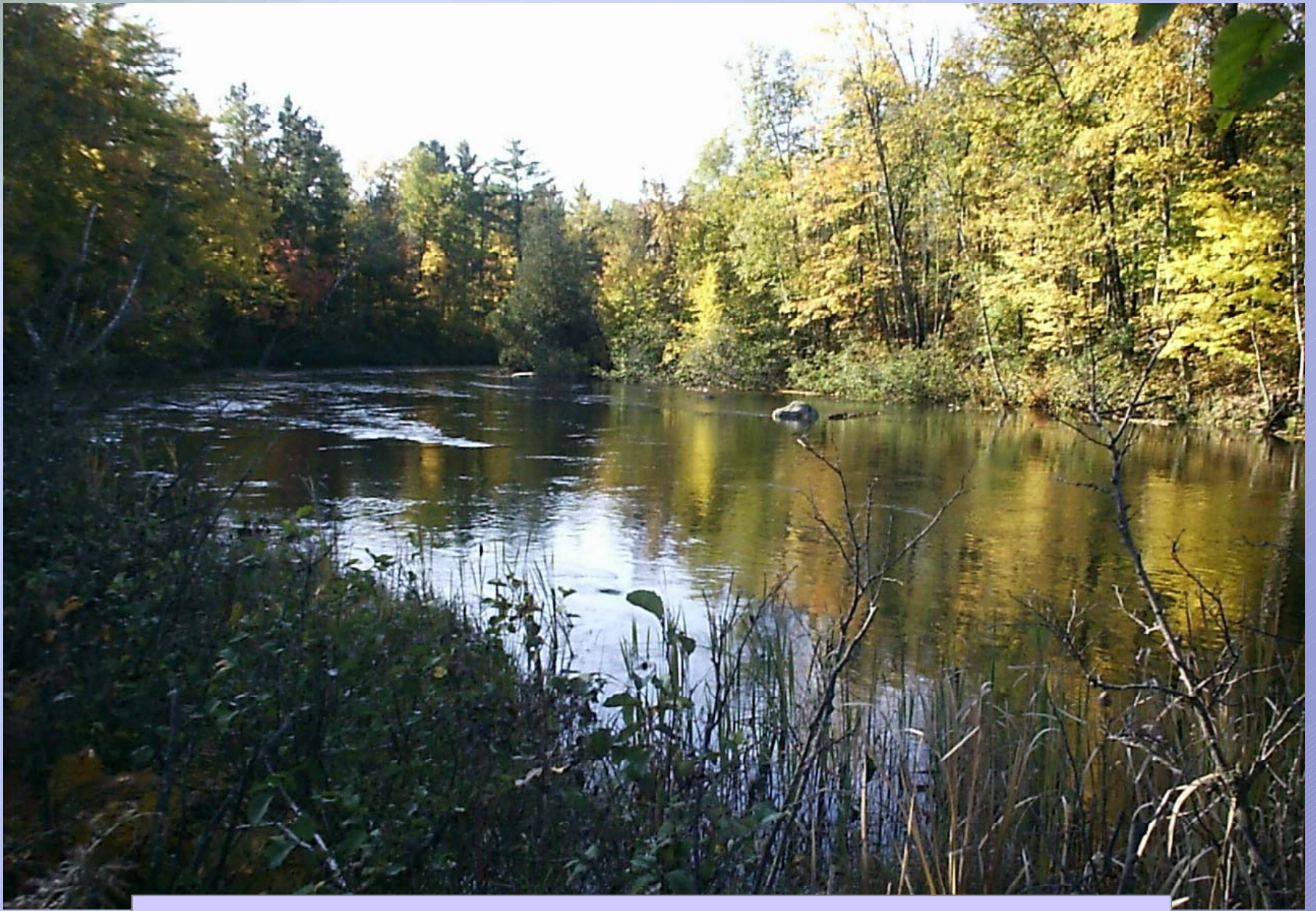
2. Reduce winter draw down by 1.0-1.5 feet.

- If inflow is 271 cfs and outflow is 180 cfs, this would require 58 days to fill the chain 30” (1 ft of storage)
 - Under the same inflow and outflow conditions, it would require 46 days to fill the chain if an additional 1.5 ft of storage.

3. Fill the chain sooner before ice out.

- Would have the same affect as number 2 above if folks are willing to consider this.

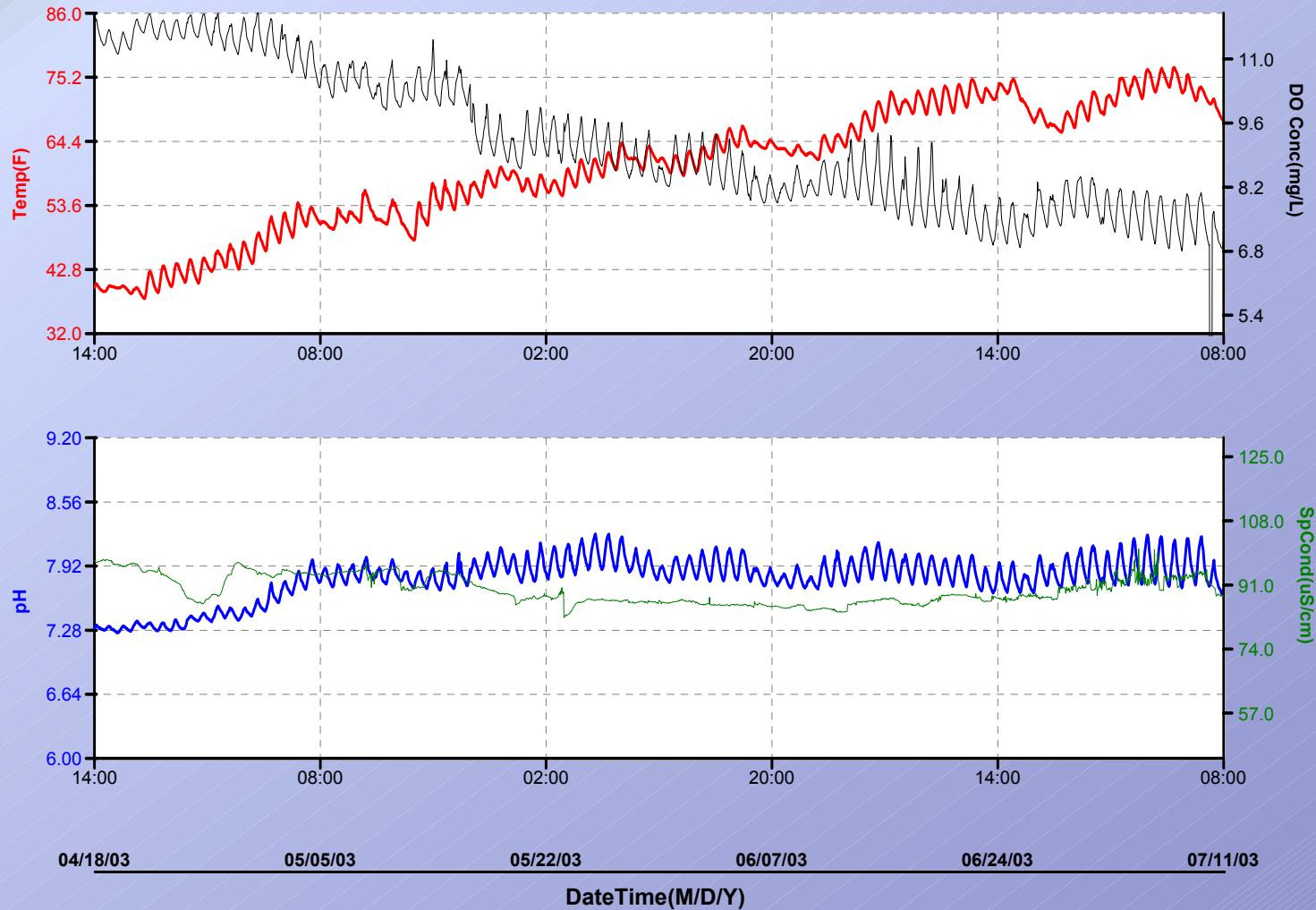
Note: Target fill date is Memorial Day. Over the last 32 years the chain has been full (8’.6”) by May 30th, only 13 times (12 years ranged from 7’.10”-8’.3” and 7 years (ranged from 7’.0” - 7’.6”).



MAY BE TEMPERATURE RELATED

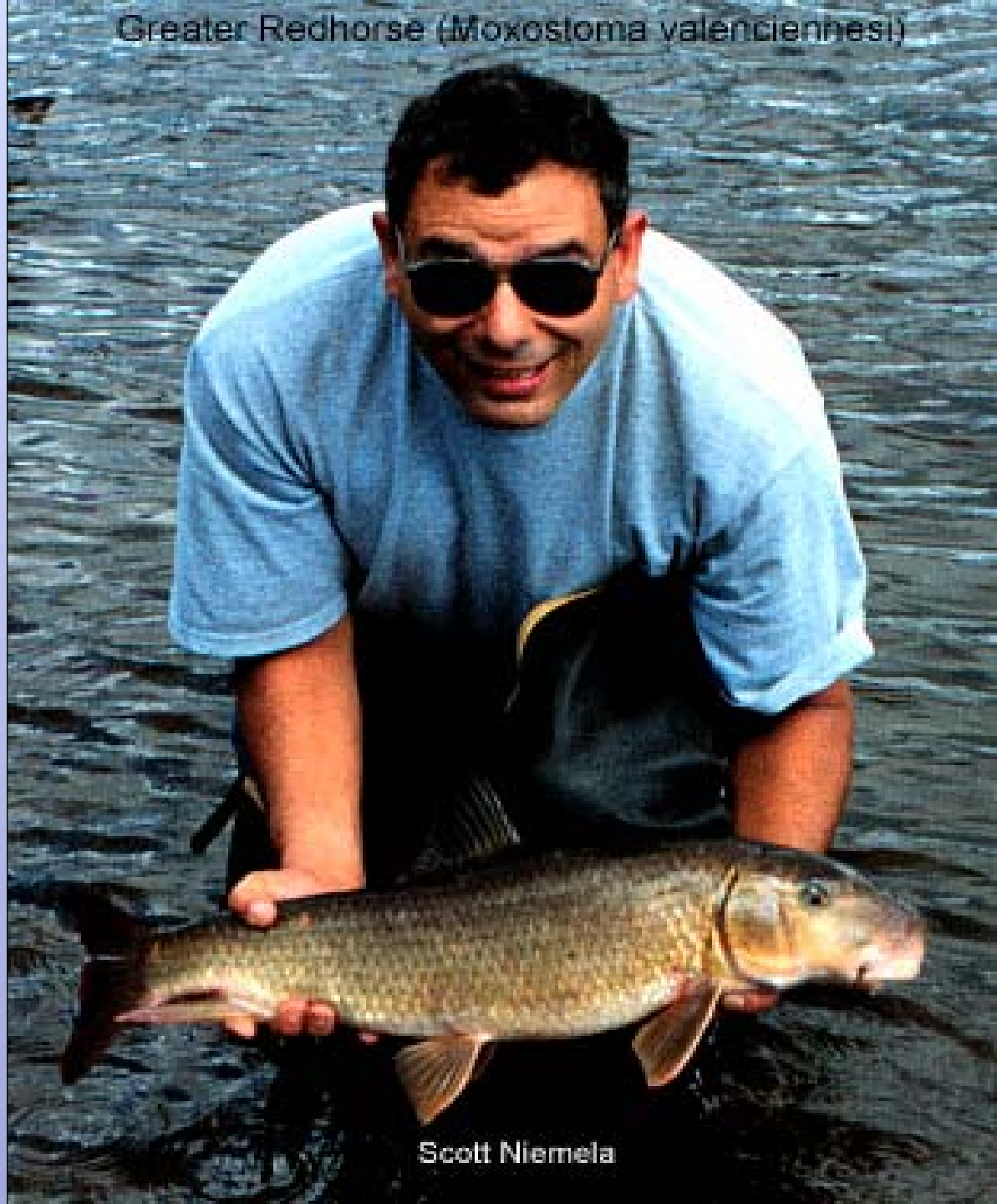
Manitowish River, Site 03

App. 1/4 mile downstream from STH-51 (Vilas Co)



PROPER SPAWNING TEMPERATURES ARE REACHED IN
EARLY TO MID MAY.

***PREDATION
BY
REDHORSE
SUCKERS***



Scott Niemela



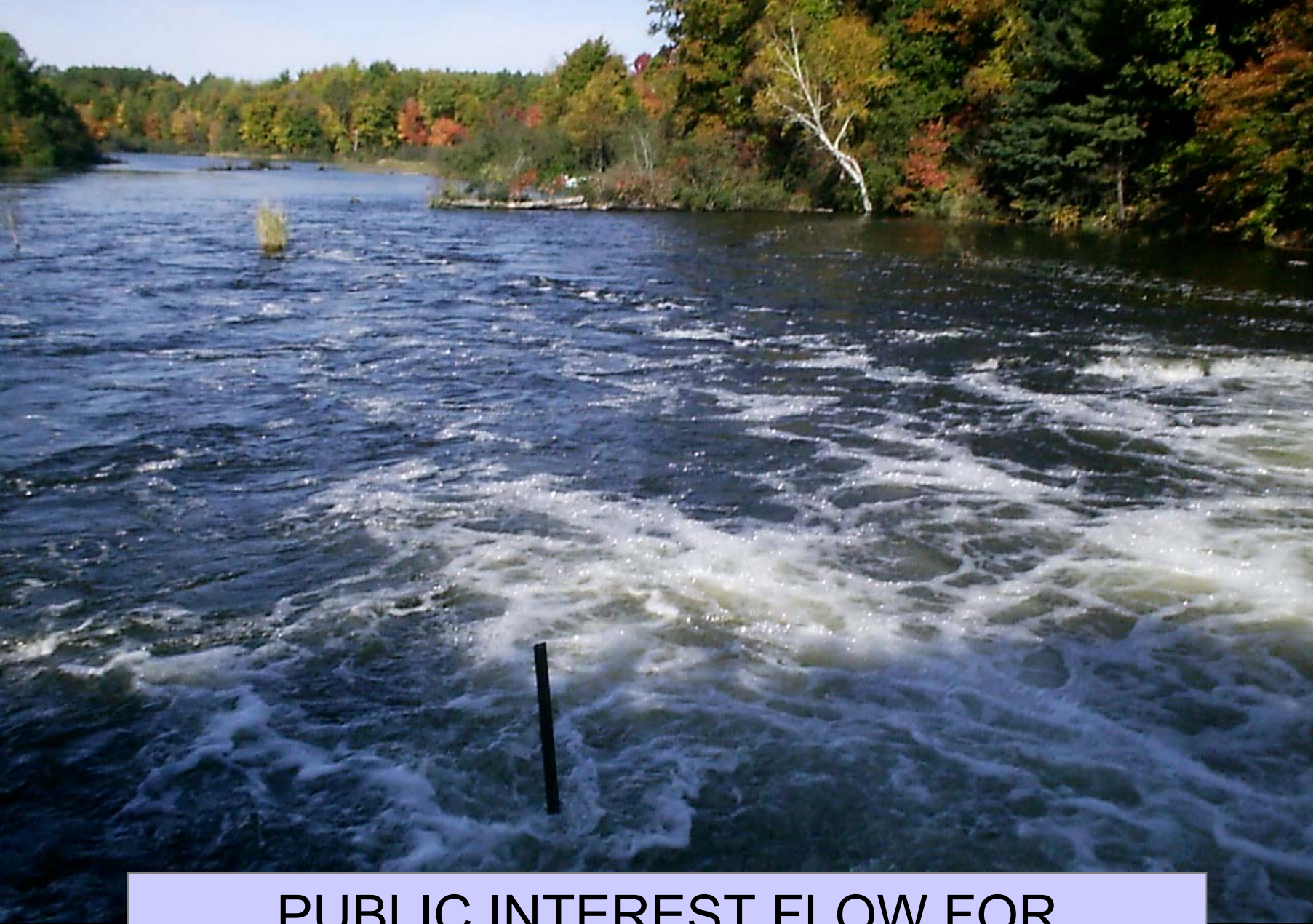
**PREDATION BY
RUSTY CRAYFISH**

- WE HAVE RULED THESE OUT AS LIMITING FACTORS.

- REDHORSE AND RUSTY CRAYFISH ARE PRESENT IN THE WOLF RIVER SYSTEM AND PREDATION DOES OCCUR, BUT SPAWNING IS SUCCESSFUL.

- REDHORSE HAVE CO-EXISTED WITH STURGEON IN THE MANITOWISH RIVER FOR THOUSANDS OF YEARS.

- RUSTY CRAYFISH PREFER ROCKY HABITAT, WHILE STURGEON FRY PREFER SAND AND PEA GRAVEL BARS SO MAJOR PREDATION OF FRY IS NOT LIKELY.



**PUBLIC INTEREST FLOW FOR
FISH/WILDLIFE AND RECREATION**

EXISTING MINIMUM FLOW OF 50 CUBIC FEET PER SECOND MAY BE SUITABLE TO PROTECT FISH/WILDLIFE AND RECREATION VALUES DOWNSTREAM DURING LOW FLOW CONDITIONS...



...BUT FLOWS BELOW THIS ARE NOT ACCEPTABLE



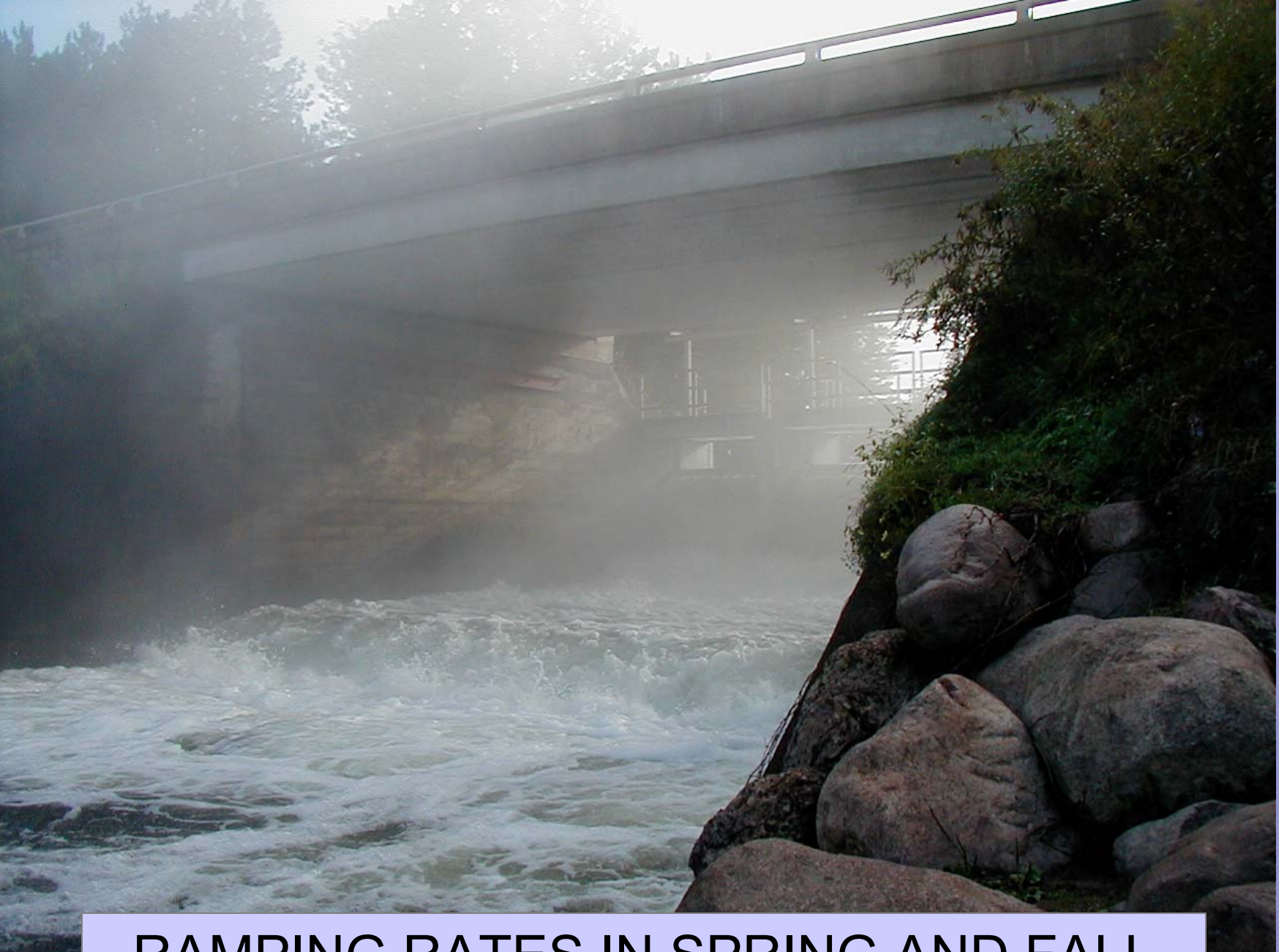
Looking upstream below Circle Lilly Creek (9/19/2003) (24 cfs)

Option to Consider

- In order to maintain a minimum flow of 50 cfs or higher during dry conditions in the summer months, may require a draw down below the 8'.6" summer target elevation.

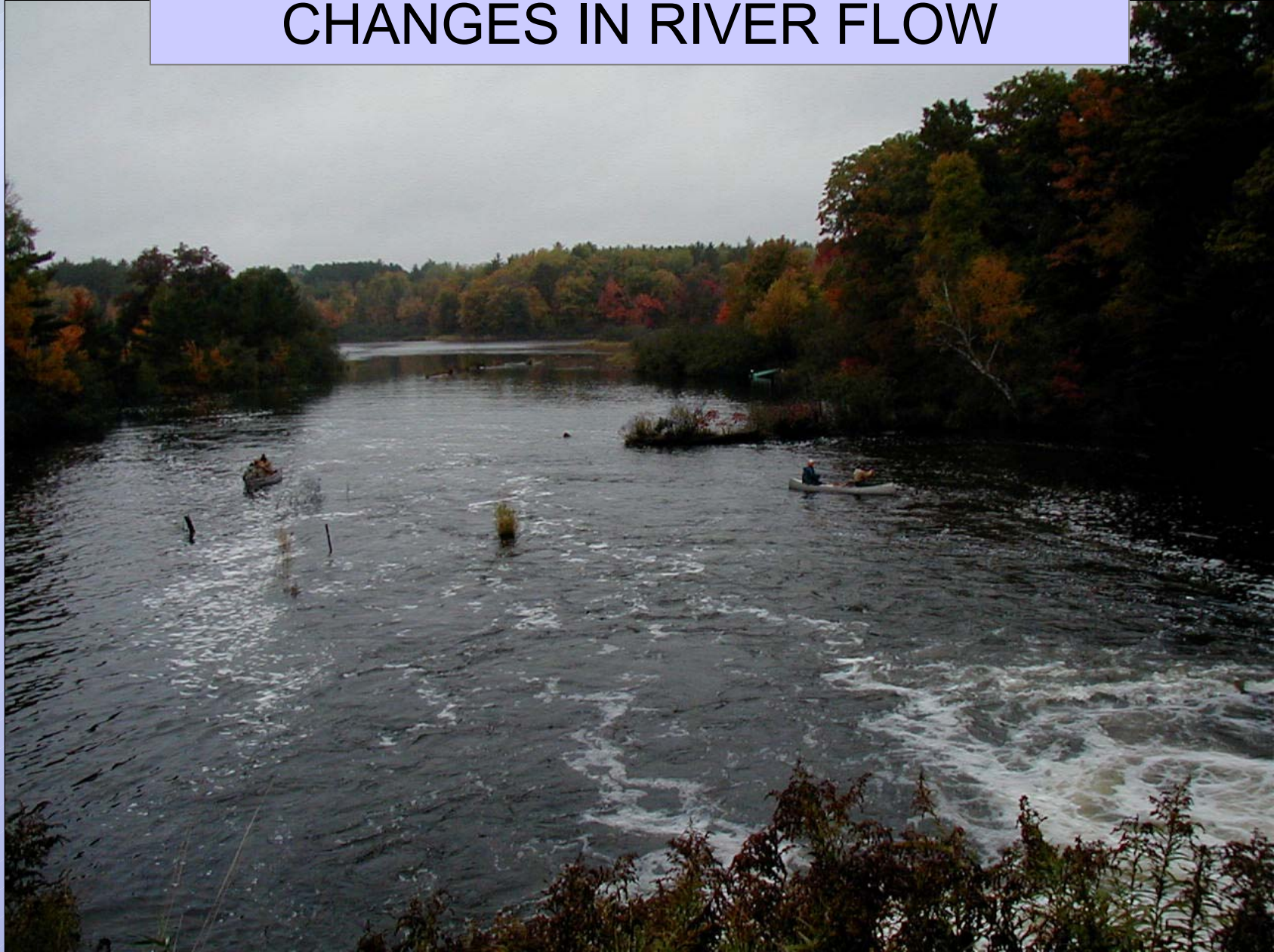
- Is the work group willing to consider this option?

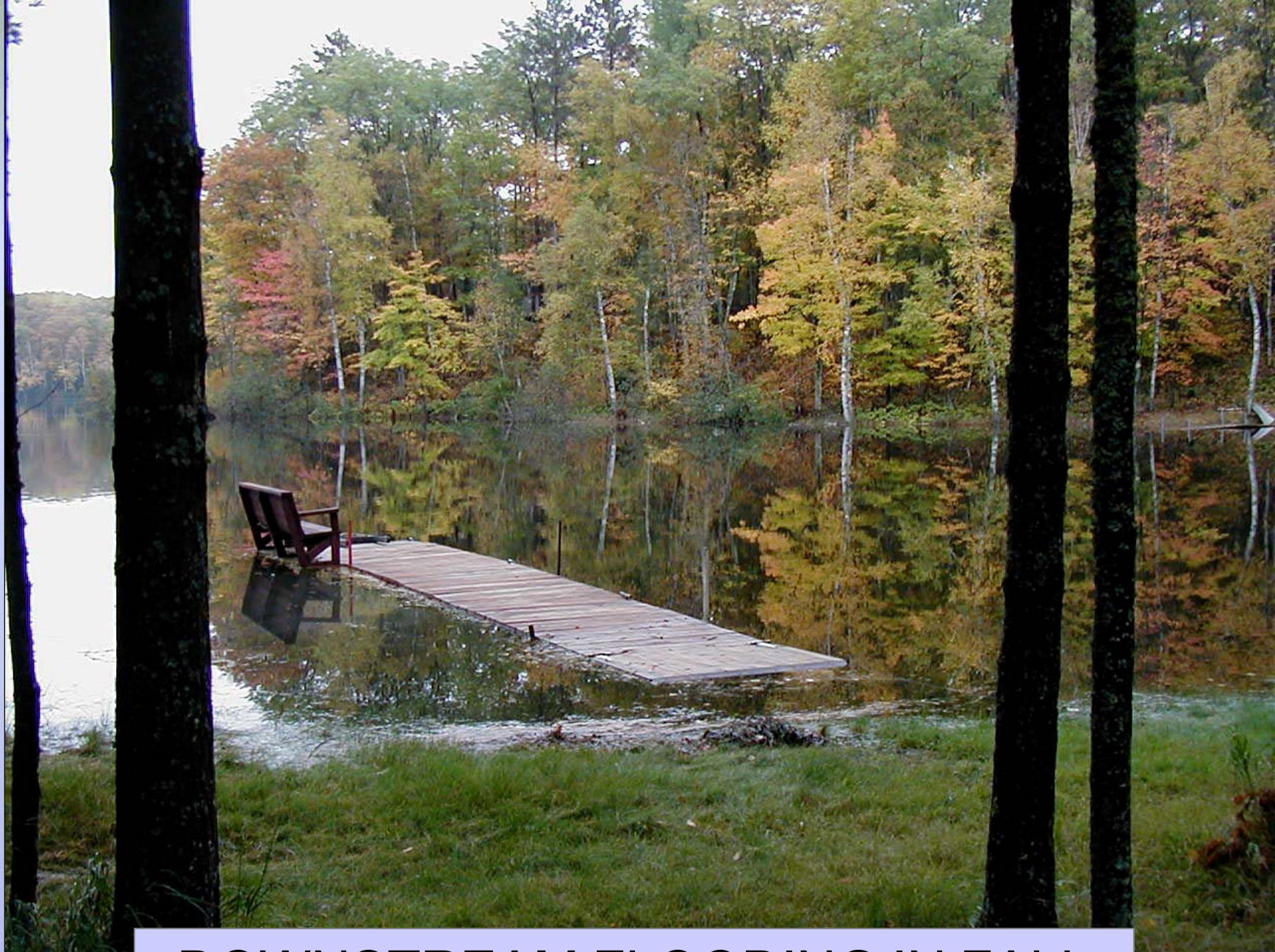
- For example (assuming no precipitation), one inch of storage will provide about 5.8 cfs of flow over a months period. So if flows drop below 50 cfs (i.e. 24 cfs), we would have to drop the chain 4.5 inches that month to maintain a flow of 50 cfs.



RAMPING RATES IN SPRING AND FALL

RESULTS IN MAJOR SHORT-TERM CHANGES IN RIVER FLOW





DOWNSTREAM FLOODING IN FALL

- WE HAVE SURVEYED IN A STAFF GAUGE ON THE TOWNSEND PROPERTY DOWNSTREAM OF THE DAM

- THIS WILL PROVIDE US DATA ON VERTICLE WATER LEVEL FLUCTUATIONS AS A RESULT OF MAJOR FLUCTUATIONS IN WATER FLOW

An option to consider to reduce major changes in river flow is to extend the draw down period beyond November 1st, or begin the draw down earlier on September 1st (at a reduced rate) instead of October 1st.

WINTER DRAWDOWNS OF 3.6 FEET





IS A 3.6 FOOT WINTER DRAWDOWN NECESSARY TO PROTECT SHORELINE STRUCTURES?

- WE WOULD LIKE TO WORK WORK WITH THE
UPSTREAM USER GROUPS TO DEVELOP A STUDY TO
EVALUATE CHANGES IN WINTER WATER LEVELS

- CAN WE HAVE A REDUCED WINTER
DRAWDOWN AND NOT DAMAGE
STRUCTURES?

- STUDY COULD TAKE PLACE DURING FALL
DRAW DOWN